

Healing the earth: an Ethiopian story

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Land degradation is one of the most serious problems facing Ethiopia today. Population pressure and low yields are forcing farmers into abandoning fallowing and crop rotations - the system they have used for millennia to maintain their livelihoods. In Tigray, the most northern region of Ethiopia, over 85% of the population are farmers who struggle to feed their families from soils in poor condition that only produce low yields of staple crops.

In order to improve crop yield in the region, the Bureau of Agriculture and Natural Resources in Tigray (BoANR) adopted the Sasakawa Global (SG) 2000 package, which is based on high input demanding varieties and chemical fertilisers. However, the cost of these inputs is beyond the purchasing power of most farmers in the region and some of those who have used these inputs have fallen into the debt trap. In addition, prolonged use of chemical fertilisers has a number of negative side effects on the environment.

A pilot experiment

The challenge is to find mechanisms that help poor rural communities to improve the environment and their capacity to produce crops without becoming dependent on external inputs. In 1996, the Institute for Sustainable Development (ISD) in collaboration with BoANR started a project in four selected rural farming communities in Tigray. The overall aim of the project was to help establish productive agricultural systems based on ecological principles that effectively managed and used local natural resources. The main components of the project included soil and water conservation practices, compost making, and the re-establishment of vegetation.

The four communities selected for the project were Zeban Sas and Gu'emse in the Eastern Zone of Tigray, Adibo Mossa in the Southern Zone and Adi Nefas in the Central Zone. Each area has its own specific characteristics. Depending on the specific needs of each of the communities, different practices were employed. These included the construction of trench bunds, check dams and ponds; the making and use of compost; the use of manure; the planting of trees, forage and grass species; use of genetically diverse seed material and natural pest and disease management.



A farmer holding a faba bean plant grown with compost. Photo: Solomon Hailemariam

The performance of the organic production system developed in each of the four communities was compared with the performance of a production system based on the Sasakawa Global (SG) 2000 package in a neighbouring village. This was done in order to compare the two strategies for sustainability.

Benefits from compost

Because compost making is a new practice in Ethiopia, some efforts were required to convince the farmers try it. At the start of the project only a small number of farmers made compost. But after observing how production increased when compost was used, many farmers started to prepare and use it. Farmers also observed that the straw from crops grown with compost was more palatable to livestock and that composting had a dramatic effect on weeds.

In 1996/97 the project started in Adibo Mossa with 45 farmers making and using compost. However, by 1998 this figure had more than doubled. In Adi Nefas, farmers not included in the project started making compost on their own personal initiative without any encouragement from the project personnel.

In every project location, farmer-managed trials were established in the fields. Yields obtained from composted fields were compared with those obtained with Diammonium Phosphate (DAP) + Urea at 100 kg/ha and 50 kg/ha, respectively. The amount of compost applied was different in each site (according to availability) and varied between 5000 kg/ha in Zeban Sas and

The four communities

Zeban Sas (Eastern Zone) is located at an altitude of between 2000 and 2400 metres above sea level. Rainfall is less than 900 mm per year and temperature averages between 16° and 20°C throughout the year. The soil is sandy silt, which tends to be extremely thin, 4–10 cm deep, with little moisture holding capacity and poor fertility. Vegetation cover is sparse. Soil degradation is a pressing problem. The main crops grown by the farmers when the project started were barley with some wheat and a little tef. Approximately two-thirds of the land is used for crops and the rest as grazing land.

Gu'emse (Eastern Zone). Climatic conditions are the same as those of Zeban Sas. The farms are on a flat alluvial plain. The soil is very deep and more fertile than in Zeban Sas. The whole plain is threatened by rapidly advancing gully caused by the seasonal stream that once formed the plain. This problem probably arises from changes in the vegetation cover of the surrounding hills.

Adi Nefas (Central Zone). The site is at the foot of a steep but low basaltic mountain range. The average rainfall is around 600 mm per year. The farmers live on the flat land that consists of vertisol soils which are prone to gully. The lower slopes of the mountain, which have better drained reddish soils but which are easily eroded because of the sloping landscape are also cultivated. These slopes have been completely deforested and their vegetation replaced by shrubs - mostly *Euclea shimperi* - which have a low productivity.

Adibo Mossa (Southern Zone). Located in the plain at the shores of Lake Hashenge, the only lake in Tigray. The site was chosen because of its high human and livestock population densities. The lake is in a closed basin with no outlet and needs careful protection from pollution from inorganic inputs.

15,000 kg/ha in Adibo Mossa. The yields of finger millet, barley and wheat on composted fields were comparable with those where chemical fertilisers had been applied. Tef, however, gave higher yields when grown on composted plots. The effect of compost on maize yields was variable when compared to the results achieved with chemical fertiliser. There were much higher straw yields from the composted plots in comparison to the chemically fertilised ones. The farmers welcomed this because their animals often have to subsist on crop residues during the dry season. The increased straw yields also enable the farmers to prepare more compost because there was more animal manure and increased plant material.

Soil and water conservation

Impressive results in soil and water conservation have been observed in three of the four project sites since 1997. The spread of gullies had been halted and soil has been retained that would otherwise have been washed away. Water retention and infiltration has also been improved.

Adi Nefas had been losing fertile land through a gully that started at the base of the neighbouring hillside. The farmers built a series of check dams up the gully, and in one year enough soil was captured to allow for the planting of grass and trees. The construction of check dams has been effective in Zeban Sas as well, although soil accumulation has been slower. Unfortunately, Gu'emse has not been successful in its attempts to halt a very wide gully that is caused by the run-off from a large catchment area of virtually bare hillside. An effort that involves several other communities upstream is required. Gullying has not been a problem in the Adibo Mossa site.

Water is very scarce during the dry season in Adi Nefas, Zeban Sas and Gu'emse and the farmers, with financial support from ISD, have now constructed ponds to collect water so that it is available in the dry season. The programme was expanded to 21 villages in 1999 and construction of trench bunds on farmlands and check dams in gullies was carried out in 14 out of the 21 new sites.

Planting of grass and trees

Various indigenous and some selected exotic forage grasses and legumes, as well as other trees and shrubs for construction and fuel, have been planted in and around farms and houses, on hillsides, around the newly constructed and maintained gullies and along trench bunds. This planting has been carried out in the four original sites as well as in 14 of the new sites. This has resulted in the farmers using forage trees for feeding their cattle, planting and protecting grasses and legumes for stabilising trench bunds and check dams, enrichment planting on degraded lands, and increasing the amount of biomass available for compost making and for feeding their animals.

In Zeban Sas, the success of the project showed first in the rehabilitation of approximately 30 hectares of abandoned, rocky grazing land. Having seen their grazing land restored, the farmers started working on other components so the area as a whole has now been almost rehabilitated and is green, with farmers getting their income from fattening and selling cattle.

Embedding sustainability in society

All four communities have now drawn up their own statutes to control the use of their land and renewable natural resources. These statutes set out rules and regulations that community members agree to and penalties for anyone who infringes them. The communities themselves developed the statutes, and the respective local governments have recognised these statutes and uphold them.

The regional government of Tigray has also adopted this project. This means that, if the ISD has to pull out, the programme will still continue. The regional government has spread the project to more than 2000 households in more than 83 villages. A very recent development is even more significant: the project has been taken up by the Environmental Protection Authority (EPA) of Ethiopia with support from UNDP and will now be upscaled to the national level.

Conclusion

The secret of the success of this project lies in the involvement at the planning stage of almost all of the stakeholders. Ensuring the active involvement of farmers requires providing a range of choices and alternatives for them to consider, rather than making prescriptions for improving one part of the farming system.

The project offers a range of choices and farmers adopt those that suit their ecological and social setting. Experience has shown that each village has a preference for one or two of the different components of the project. At Zeban Sas, the emphasis has been on soil and water conservation, because the area was badly affected by soil degradation. At Gu'emse and Adibo Mossa farmers adopted composting rapidly, because there was already sufficient plant material and animal manure for making this natural fertiliser.



A woman working in her compost pit in Zeban Sas. Photo: Solomon Hailemariam

At Gu'emse, check dams were not very effective in halting gullying and halting the spread of gullies is now the community's top priority.

The farmers at Adi Nefas are actively participating in all components of the project, much more noticeably than at the other sites. This is probably because of the rapid positive outcomes of making check dams and preparing and using compost. These early successes, coupled with the high population density, have given farmers a strong motivation for intensifying the use of their land in a sustainable way. ■

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